Check of non-prompt neutrino generation

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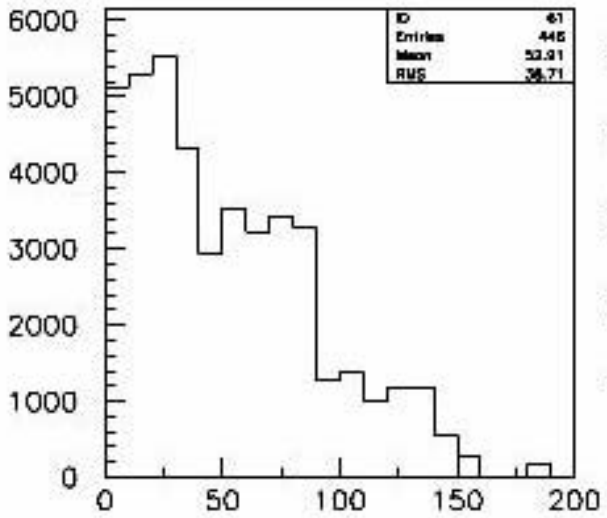
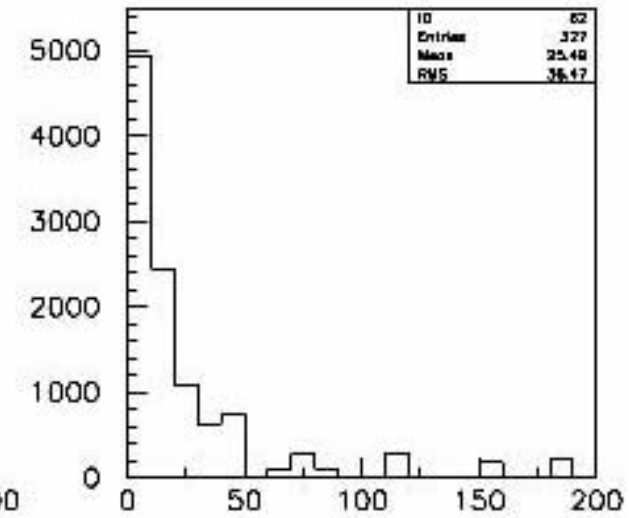
MC problem

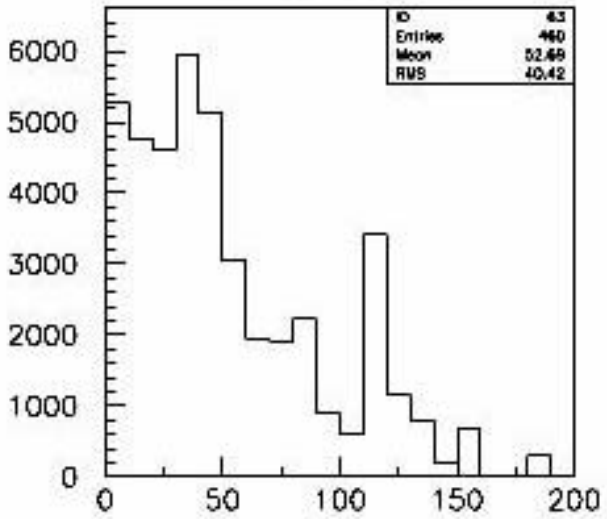
- Investigated NC true events with muon tracks
- Found bug in evgen, inter and lepin for non-prompt (NP) events
  - Variable inter (2 = CC, 3 = NC) was changed, but inter_stor (written to rft file) was not
  - Variable lepin (+/-14=ν_μ ,$\overline{\nu}_\mu$) was also changed
- Fixed bug and added mc_truth NP flag
- Generated 2k Period 4 events
  - Curious NP muon momentum spectrum and wrong(?) number of weighted events (next page)



Prompt mu mom



Non−prompt mu mom



e energy

Reconstructed variables

	Weights	Fraction
Ccmu prompt	43719	31%
Ccmu non-prompt	11022	8%
Cce	43456	31%
NC	33488	24%
tau	8873	6%

Page 101 from Patrick's thesis

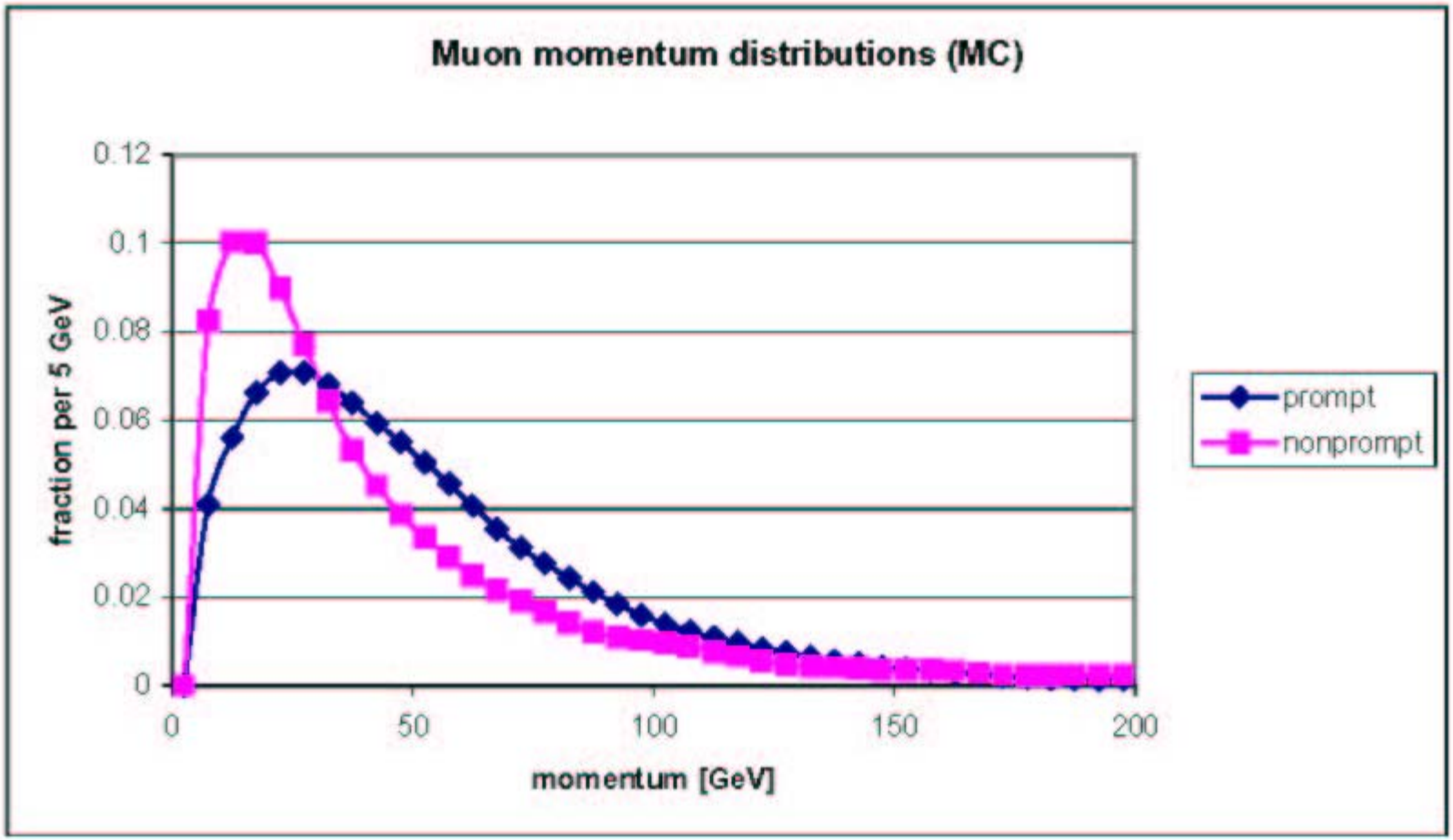
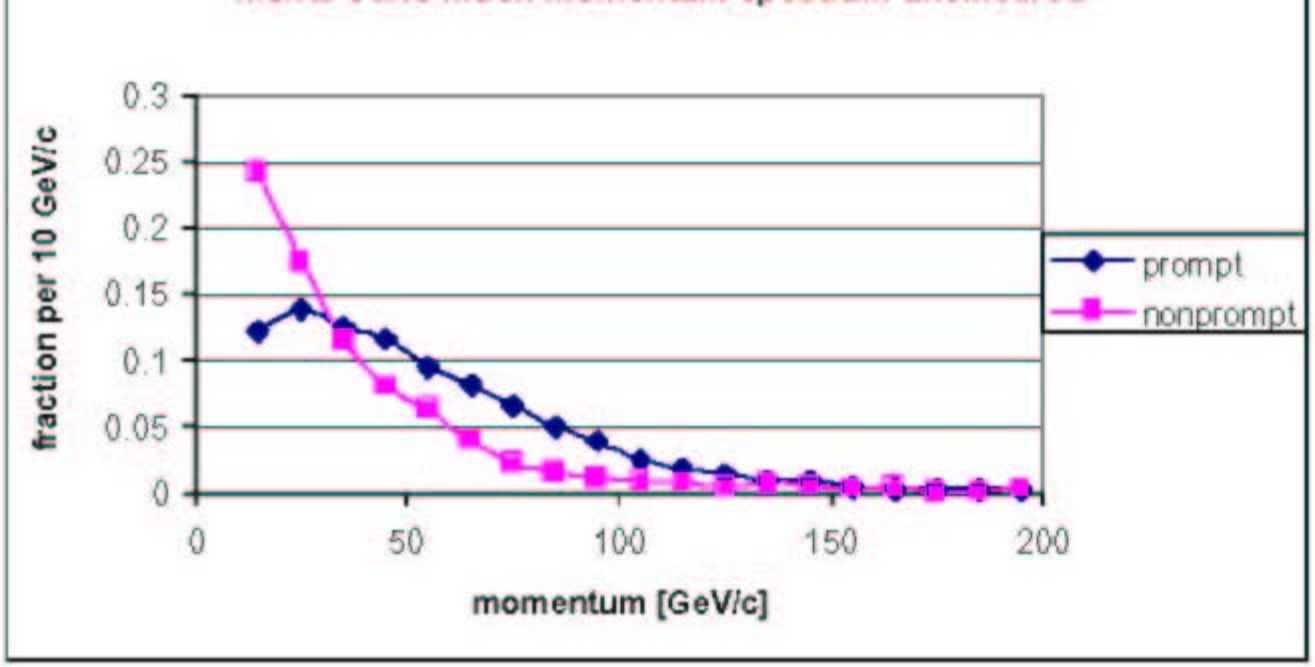
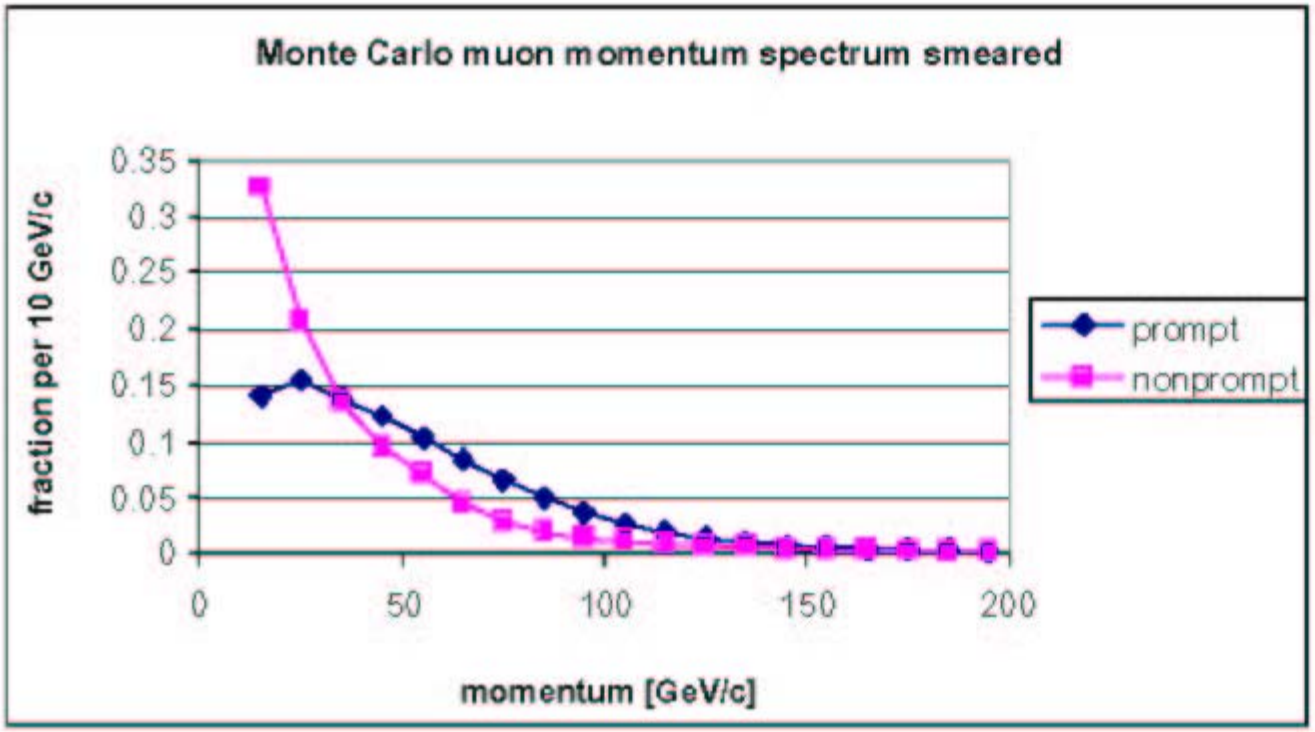


Figure 6-1: Monte Carlo momentum distributions for prompt and nonprompt muons. Both distributions are normalized to unit area.

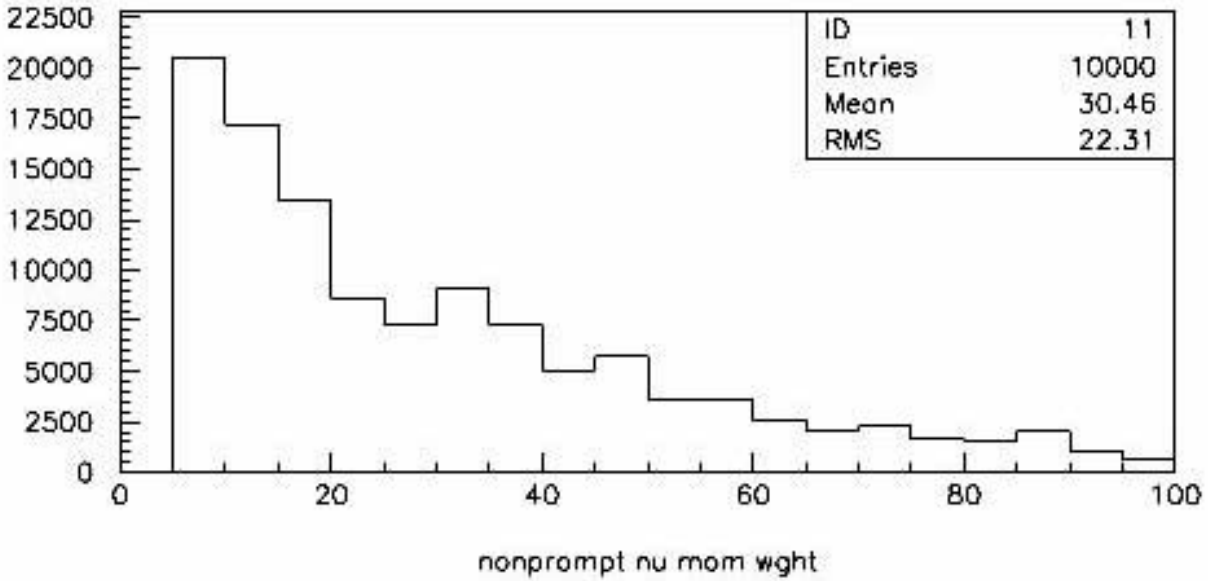




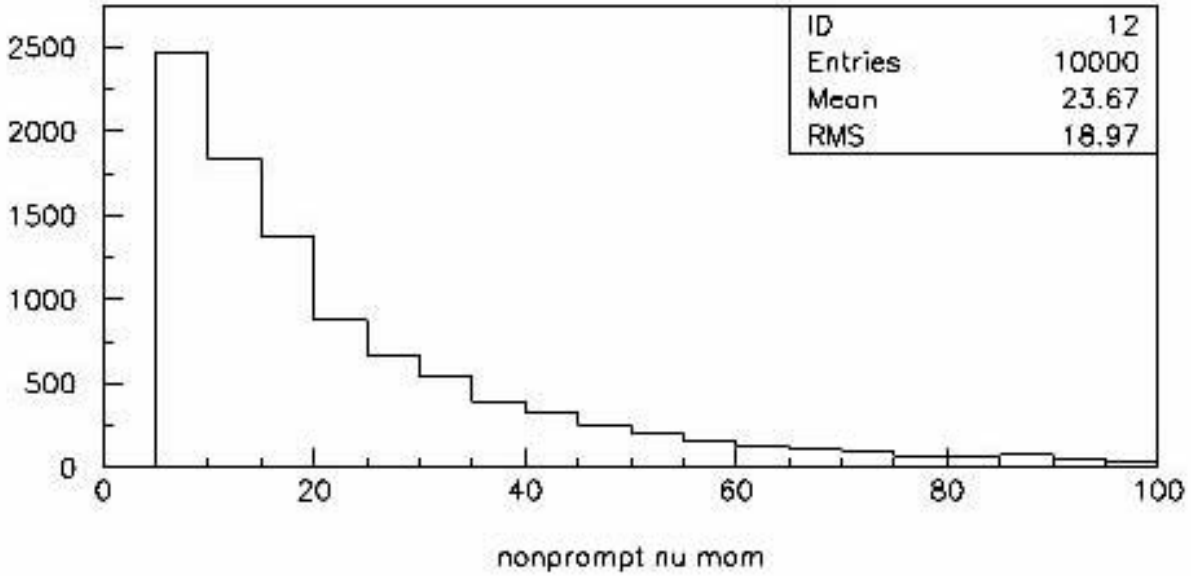
Page from Patrick talk in Oct 2000

Check the non-prompt neutrino "generator"

- Non-prompt neutrinos in $MDAT/nonprompt.dat
- File of 10k (px,py,pz, weights, flag for ν_μ ,$\bar{\nu}_\mu$)
- Non-prompt neutrinos are generated by randomly selecting an event
  - Event weighted by 6.3,3.2 for ν_μ ,$\overline{\nu_\mu}$
  - Weight scaled by pz
  - Passed to lepto



Patrick's weighting scheme



Wght=1

Figure 5-9: Simulated energy spectra for the three different prompt neutrino contributions. The spectra are essentially the same for muon and electron neutrinos. Each component is individually normalized to unit area.

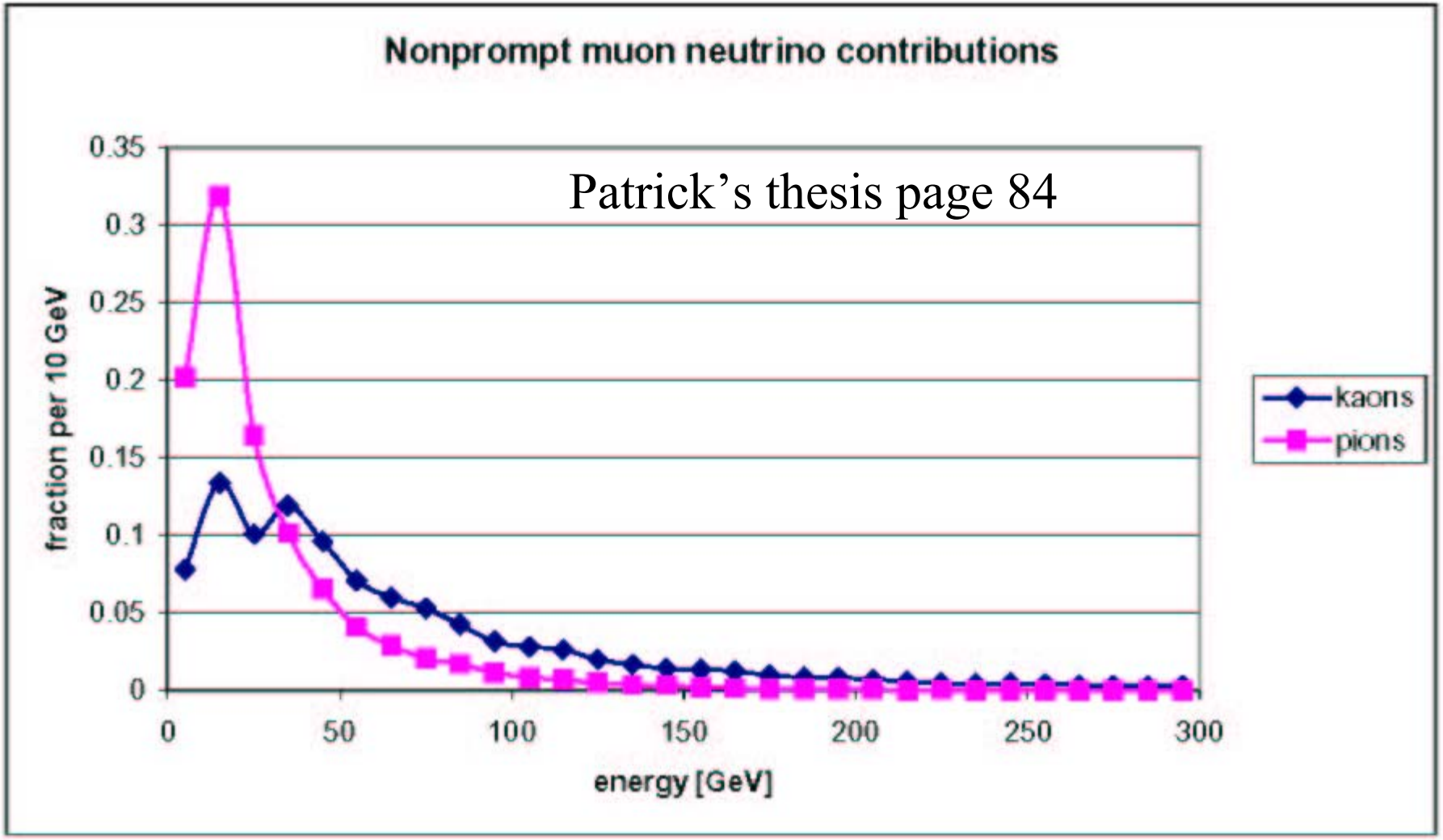
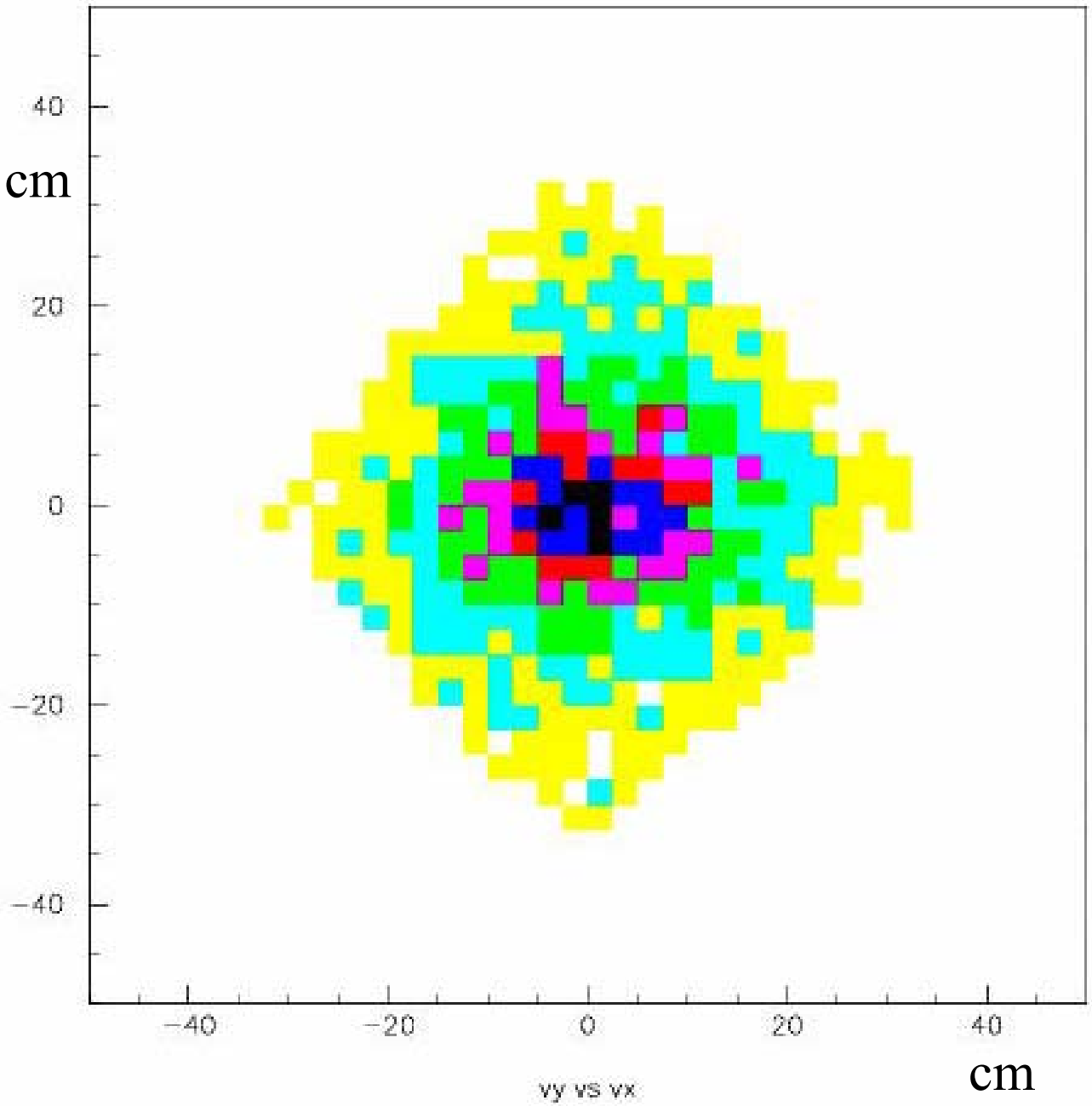
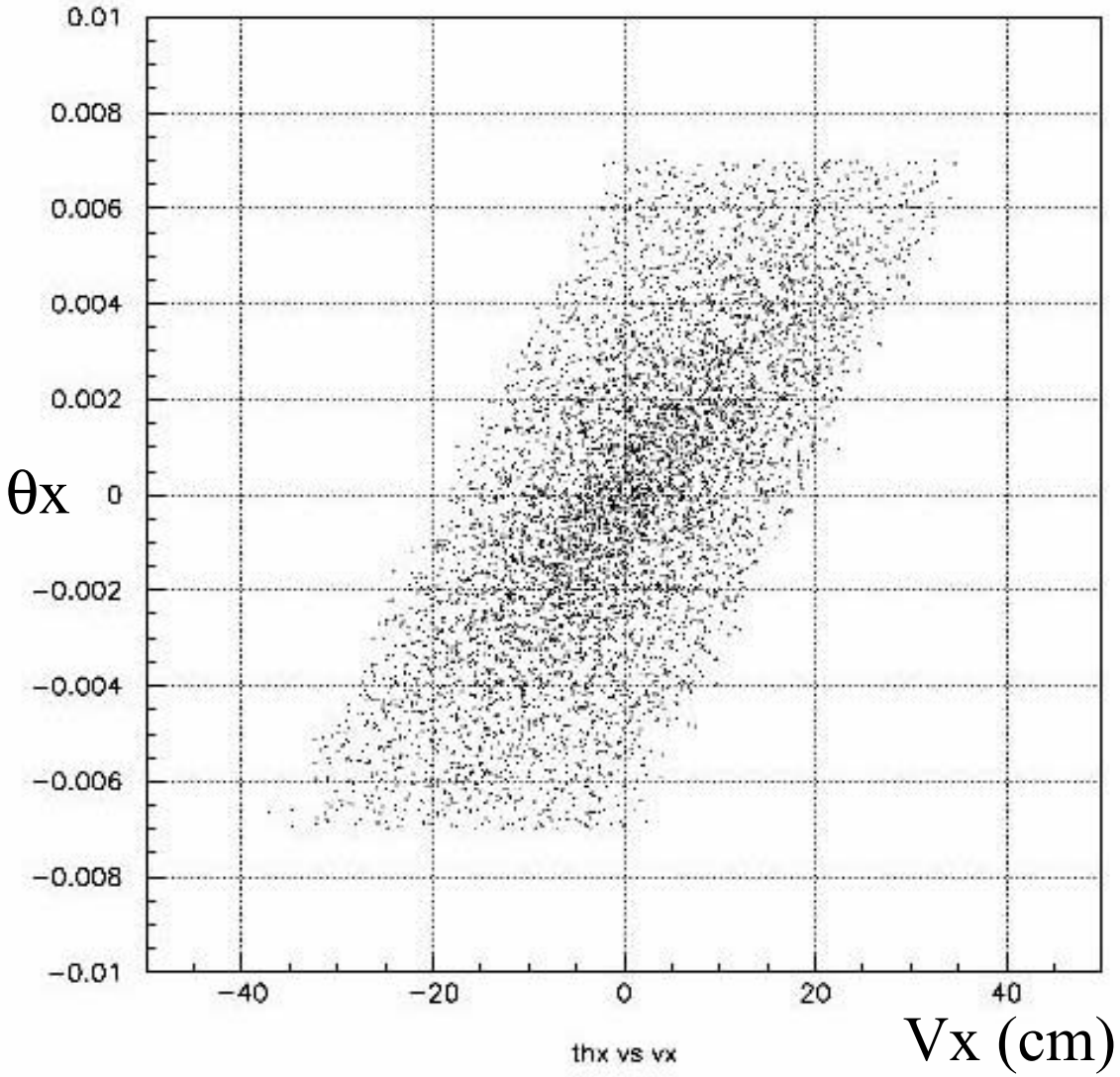


Figure 5-10: Simulated energy spectra for the two nonprompt muon neutrino contributions. Each component is individually normalized to unit area.



Vtx pos at emulsion tgt



Non prompt ν source at –2600 cm

Dump at –3650 cm

Summary

- Non-prompt spectrum & weights are wrong
- Options
  - Contact Patrick to help understand this
  - Find the right nonprompt.dat
  - Reverse engineer the ν generator using the plots in this talk